

[54] **SPREAD SPECTRUM COMMUNICATION SYSTEM EMPLOYING COMPOSITE SPREADING CODES WITH MATCHED FILTER DEMODULATOR**

[75] Inventors: Donald K. Belcher, West Melbourne; W. Scott Bradley, Palm Bay; Darrell R. Gimlin, Melbourne Beach; James P. Klaassen, Palm Bay, all of Fla.

[73] Assignee: Harris Corporation, Melbourne, Fla.

[21] Appl. No.: 326,988

[22] Filed: Mar. 22, 1989

[51] Int. Cl.⁵ H04K 1/00

[52] U.S. Cl. 375/1

[58] Field of Search 375/1

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,808,536	4/1974	Reynolds	375/1
4,225,935	9/1980	Zscheile, Jr. et al.	375/1
4,601,047	7/1986	Horowitz et al.	375/1
4,759,034	7/1988	Nagazumi	375/1
4,908,836	3/1990	Rushfort et al.	375/1

OTHER PUBLICATIONS

IEEE Trans. on Comm., vol. 36, No. 5 (5/5/88) pp. 564-576, Fischer et al., "Wide Band Packet Radio for Multipath Environments".

Proc. IEEE, vol. 75, No. 1, (1/87) pp. 33-42, Fifer, "The Low Cost Packet Radio".

1987 IEEE, pp. 86-90, Kavehrad et al., "Exp. with DSSS Using DPSK for Indoor Wireless Communication".

Elect. Eng. Labs, U. of Manchester M13, 9PL UK, 7

pages, Beale (1980), "A Class of Composite Sequences & its Implications for Matched Filter Processing".

Primary Examiner—Salvatore Cangialosi
Attorney, Agent, or Firm—Evenson, Wands, Edwards, Lenahan & McKeown

[57] **ABSTRACT**

A hybrid despread and demodulation receiver for low symbol rate communications employs a passive (SAW) matched filter to remove a "short" coding portion of a composite spreading code that has been used to spread the data signal. The composite spreading sequence is formed by multiplying different length coding sequences, thereby obtaining an overall signal processing operator the duration or symbol span of which is sufficient to maintain a high signal processing gain, but is considerably longer than can be processed using a practical sized passive (e.g. SAW) filter design. The design of the receiver takes advantage of the fact that the relatively short sequence can be despread using a practical SAW structure and is comprised of a hybrid signal processor, the front end of which contains a compact SAW matched filter and the downstream end of which is implemented using analog processing components. The matched filter removes the relatively short spreading sequence from the received signal and feeds its output to a mixer, which combines the output of the matched filter with the longer coding sequence to complete the despread process. The despread signal is then differentially coherently decoded and coupled to an integrate and dump circuit, which accumulates the energy in successive long code symbol intervals in order to determine the value of the respective data bits.

19 Claims, 2 Drawing Sheets

